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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WOLDEKIDAN, HIBRET ASNAKE	

ART UNIT	PAPER NUMBER
2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.**	**Applicant(s)**	
	10/581,327	MASUDA ET AL.	
	Examiner	**Art Unit**	
	Hibret A. Woldekidan	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06/10/2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14 and 17-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,14 and 17-19* is/are rejected.

7)☒ Claim(s) *12,13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Examiner acknowledges receipt of Applicant's Amendments, remarks, arguments received on 06/10/2010. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1,2,4,5,7,17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (US 2003/0169479).

Considering claim 1 Liu discloses an optical fiber communication system **(See Paragraph 21,fig. 1 i.e. all Raman pumped WDM optical system(100))** comprising: silica fiber laid throughout a city as a gain medium for Raman amplification to amplify a signal light**(See Paragraph 21,3,fig. 1 i.e. over 100 km silica fiber which can be laid throughout a city)**; a pumping light source that emits a forwarding pumping light with <u>a plurality of wavelengths</u> that co-propagates through the silica fiber in the same direction as the signal light and pumps the signal light**(See Paragraph 23,fig. 1,4b i.e. a forward pump light source(120) for emitting multiple wavelengths that co-propagate with the signal light. As shown in fig. 4b, the pumping light has a plurality of wavelengths)**; and a multiplexer disposed between

the silica fiber and the pumping light source that multiplexes the signal light and the pumping light**(See Paragraph 23,fig. 1 i.e. a WDM(180_1) disposed between the silica fiber(150) and pump light source(120))**, wherein the multiplexer is provided with a means to multiplex the signal light input thereto having a wavelength longer than the zero-dispersion wavelength of the silica fiber and the pumping light emitted from the pumping light source**(See Paragraph 23,fig. 1,4c i.e. a wavelength division multiplexer(WDM)(120) is provided with a means for multiplexing the input signal light with the pump light emitted from the pump light source(120). The input signal light which is in the wavelength range of 1550-1610nm(See fig. 4c) which is longer than the zero-dispersion wavelength of a silica fiber which is around 1300nm),** and the pumping light source is equipped with a means to emit forward pumping light**(See Paragraph 23,fig. 1 .e. a forward pumping light source(120) equippedto emit forward pumping light)**.

Liu does not specifically disclose the longest wavelength of the pumping light being shorter than the shortest wavelength of the signal light so as to have a frequency difference of 13.7 to 17.9 THz **(See Paragraph 23,fig. 1 i.e. the pump light source is controlled by a control unit(110_1) to adjust the wavelength generated from the pump light source)**.

However, Liu discloses a controller(110_1) that automatically adjusts the pump wavelengths based on signal gain profile**(See Paragraph 24).** The controller controls the forward pumping source(120) and backward pumping source(130) by utilizing the gain spectrum data provided by the monitoring units(170) and adjust the pump

parameters which includes wavelengths to be generated by the pumping units**(See Paragraph 24,fig. 1)**. As further discussed the controller has a processor, a memory and control programs**(See Paragraph 26,fig. 1,2).** He further discusses adjusting the pumping wavelength to achieve a desired flat gain profile by manipulating an equation in the controller**(See Paragraph 49,eq 8)**. The pumping wavelength is ranged in 1440nm-1510nm(See fig. 5). He further discusses tuning the pumping wavelength to adjust the position of the gain bandwidth(See Paragraph 3).

Since the controller has a processor, a memory unit and control programs that can be programmed to manipulate the pumping sources to generate a desired wavelength by utilizing the feedback signal from the monitoring unit and generate a control signal that drive the pumping source, it would have been obvious to one of ordinary skilled in the art at the time the invention was made to program the controller to generate a control or drive signals that enable the pumping sources to generate pumping light within certain wavelength range to fulfill *the longest wavelength of the pumping light to be shorter than the shortest wavelength of the signal light so as to have a frequency difference of 13.7 to 17.9 THz* or any desired pumping wavelength value.

Considering claim 2 Liu discloses the optical fiber communication system in accordance with claim 1, wherein the silica fiber is a dispersion-shifted fiber**(See Paragraph 23, fig. 1 i.e. part of the silica fiber is a dispersion shifted fiber(DCF)(160))**, and the signal light comprises a plurality of wavelengths in the L band**(See fig. 4c i.e. since the signal light is in the range of 1550-1610nm and L**

band is in the wavelength range of 1570nm-1600nm, the signal light has multiple wavelengths in the L-band).

Considering Claim 4 Liu discloses the optical fiber communication system in accordance with claim 1, wherein a remotely-pumped double-pass EDF module is provided at a signal light output stage of the silica fiber**(See Paragraph 23 fig. 1 i.e. bidirectionally or double pumped fiber(150) using a forward pumping(120) and backward pumping(130) is provided with a single light output stage.**

Liu does not explicitly disclose the wavelengths of the pumping light are not less than 1430 nm and not more than 1470 nm.

However, Liu disclose a controller(110_1) is provided to adjust or tune the pump wavelength(see fig. 1,Paragraph 24). Therefore the controller can be programmed to control the pumping units to generate a desired wavelength range as discussed in claim 1.

Claim 5 is rejected for the same reason as in claim 4.

Considering Claim 7 Liu does not explicitly disclose optical fiber communication system in accordance with claim 2 or claim 3, wherein when the minimum value of the wavelength of the signal light is λs, the minimum value of the zero-dispersion wavelength of the silica fiber is λo, and the maximum value of the wavelengths of the pumping light from the pumping light source is λp, the wavelength of the signal light, the zero-dispersion wavelength, and the wavelengths of the pumping light are set so that $2\lambda o - \lambda s > \lambda p$.

However, Liu disclose a controller(110_1) is provided to control the forward pumping source(120) and to the backward pumping source(130) to adjust the pump wavelength provided by the pumping sources**(See Paragraph 23,24,fig. 1)**. Since the controller has a processor, a memory unit and control programs that can be programmed to manipulate the pumping sources to generate a desired wavelength by utilizing the feedback signal from the monitoring unit and generate a control signal that drive the pumping source(See Paragraph 24,26,fig. 1,2), it would have been obvious to one of ordinary skilled in the art at the time the invention was made to program the controller to generate a control or drive signals that enable the pumping sources to generate pumping light within certain wavelength range to provide the pump light wavelength to fulfill the equation $2\lambda o - \lambda s > \lambda p$ or any other value as discussed in claim 1.

Considering Claim 17 Liu does not explicitly disclose the optical fiber communication system in accordance with claim 1, wherein the wavelength of the signal light is a single wavelength, with the difference between the wavelength of the signal light and the longest wavelength of the pumping light being, in terms of a frequency difference, 15.6 THz or more.

However, Liu disclose a controller(110_1) is provided to control the forward pumping source(120) and to the backward pumping source(130) to adjust the pump wavelength provided by the pumping sources**(See Paragraph 23,24,fig. 1)**. Since the controller has a processor, a memory unit and control programs that can be programmed to manipulate the pumping sources to generate a desired wavelength by

utilizing the feedback signal from the monitoring unit and generate a control signal that drive the pumping source(See Paragraph 24,26,fig. 1,2), it would have been obvious to one of ordinary skilled in the art at the time the invention was made to program the controller to generate a control or drive signals that enable the pumping sources to generate pumping light within certain wavelength range to provide the difference between the longest wavelength of the pumping light and the wavelength of the signal light being, in terms of a frequency difference, 15.6 THz or more or any other value as discussed in claim 1.

3. Claims 3,6,8-10,14,18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (US 2003/0169479) in view of Miyamoto et al. (US 2004/0028416).

Considering Claim 3 Liu discloses the optical fiber communication system in accordance with claim 1, the signal light comprises a plurality of wavelengths in the C band**(See fig. 4c i.e. since the signal light is in the range of 1550-1610nm and C band is in the wavelength range of 1530-1570nm, the signal light has multiple wavelengths in the C-band)**.

Liu does not explicitly disclose the silica fiber is a non-zero dispersion-shifted fiber.

Miyamoto teaches the silica fiber is a non-zero dispersion-shifted fiber**(See Paragraph 87, fig. 3 i.e. the optical transmission line(120) is a non zero dispersion shifted fiber(NZDSF))**.

It would have been obvious to one of ordinary skill in the art at the time the

invention was made to modify the invention of Liu, and have the silica fiber to be a non-zero dispersion-shifted fiber, as taught by Miyamoto, thus providing an efficient transmission system by uniformly maintain the transmission quality of the signal channels by using a non-zero dispersion shift fiber that enable the system to overcome the problem of dispersion shifted fiber, as discussed by Miyamoto (Paragraph 7).

Considering Claim 6 Miyamoto teaches the optical fiber communication system in accordance with any one of claims 1 through 5, wherein the pumping light source is a laser diode with a fiber Bragg grating or a fiber laser**(See Paragraph 54 i.e. the pump light source is a fiber grating laser light source)**.

Considering Claim 8 Liu discloses the optical fiber communication system in accordance with claim 7 the wavelengths of the pumping light
are set so that $2\lambda o - \lambda s > \lambda p + 10$**(See Paragraph 24,28 i.e. a controller for controlling the pump sources to dynamically generate a desired wavelength as discussed in claim 7)**.

Miyamoto teaches the pumping light source is a multiwavelength laser
diode with a fiber Bragg grating or a Fabry-Perot laser diode, and the wavelength of the signal light, the zero-dispersion wavelength**(See Miyamoto: Paragraph 54 i.e. the pump light source is a fiber grating laser light source or a Fabry-Perot laser)**.

Claim 9 is rejected for the same reason as in claim 8.

Considering Claim 10 Miyamoto teaches the optical fiber communication system in accordance with claim 8, wherein the width of the multiwavelength is 10 nm or less**(See Paragraph 9,78 i.e. a channel spacing of 10nm)**.

Considering Claim 14 Liu discloses the optical fiber communication system in accordance with claim 2 or claim 3, wherein a power spectrum of the signal light is set so that the power of the signal light input to the silica fiber decreases the further to the short wavelength side where the Raman gain due to the Raman amplification is large**(See Paragraph 24,28 i.e. a controller(110) for controlling the pump sources to dynamically generate a desired wavelength as discussed in claim 7)**.

Claim 18 is rejected for the same reason as in the claim 10.

1. Claims 11,19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (US 2003/0169479) in view of Miyamoto et al. (US 2004/0028416) further in view of Wai et al. (20040184491).

Considering Claim 11 Liu and Miyamoto do not specifically disclose the optical fiber communication system in accordance with claim 8, wherein the pumping light source is provided with a variable attenuator on an output side of a polarization multiplexing Fabry-Perot laser diode to adjust an output of the pumping light from each Fabry-Perot laser diode pumping light

Wai teaches the optical fiber communication system in accordance with claim 8, wherein the pumping light source is provided with a variable attenuator on an output side of a polarization multiplexing Fabry-Perot laser diode to adjust an output of the pumping light from each Fabry-Perot laser diode pumping light**(See Paragraph 91, fig. 3 i.e. a light source is provided with a variable attenuator to adjust the output signal on an outside of a Fabry-Perot Laser diode).**

It would have been obvious to one of ordinary skill in the art at the time the

invention was made to modify the invention of Liu and Miyamoto, and have the pumping light source to be provided with a variable attenuator on an output side of a polarization multiplexing Fabry-Perot laser diode to adjust an output of the pumping light from each Fabry-Perot laser diode pumping light, as taught by Wai, thus providing an efficient transmission system by providing a variable attenuator to control and stabilize the output power of a rapidly changing state of polarization, as discussed by Wai (Paragraph 5).

Claim 19 is rejected for the same reason as in the claim 11.

Allowable Subject Matter

Claims 12,13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hibret A. Woldekidan whose telephone number is (571)270-5145. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on 5712723078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. A. W./
Examiner, Art Unit 2613

/Kenneth N Vanderpuye/
Supervisory Patent Examiner, Art Unit 2613